J.C. Headwaters, Inc.

Hydroacoustic Investigations of Diamond Lake Spring 2003

Prepared for the
Oregon Department of Fish & Wildlife
Roseburg, Oregon

By

JC Headwaters, Inc.
Bend, Oregon

June 19, 2003

J.C. Headwaters, Inc., 1972 NE 3rd, PMB 341, Street, Bend, OR 97701

An hydroacoustic investigation of Diamond Lake was conducted June 9-12, 2003 to re-map the original channel used to lower the stage Diamond Lake in 1954 and for the purpose of investigating the behavior and abundance of the fisheries in the lake. The hydroacoustic analysis was conducted with a BioSonics DT-X 200 KHz split-beam unit linked with a Sokkia DGPS. The hydroacoustic unit was pulsed at a frequency of 5 X/second during the first part of the work and the frequency was increased to 10 X/second. Pulse length was set to 0.4 seconds for the fisheries applications and 0.1 seconds for the bathymetric analysis of the channel. The threshold was set to –65 db for much of the fisheries work, although this was increased up to –85 to observe the relationship between the tui chub and the larger zooplankton.

The results for the channel mapping are shown in Figures 1-5. The channel is still relatively intact, although some areas of channel sidewall slumping were evident. The figures of the map show the substrate without the presence of the macrophytes, which are abundant through substantial portions of the channel. Note that the channel terminates before the lake edge and the section of about 25 m in length appears to have been filled in following the completion of the lake treatment in 1954.

The fisheries reconnaissance consisted of running multiple north-south transects through the deepest portion of the lake and conducting several perimeter passes at several depth zones both in day and night. Unlike the survey conducted in August, 2002, the nighttime surveys did not reveal any substantial differences in fish abundance between the daytime runs. Macrophytes apparently contained large number of chub (based on the shoreline netting) that could not be detected with the hydroacoustic device (Figure 6). The greatest zones for tui chub accumulations were consistently along the north shore at depths of 5 to 6 meters (Figures 7, 8, & 10). Trout were occasionally seen as single targets interspersed among the chub on the north shore, although the largest numbers of trout were observed in the deepest area of the lake during the last night survey on June 11, 2003 (Figure 9).

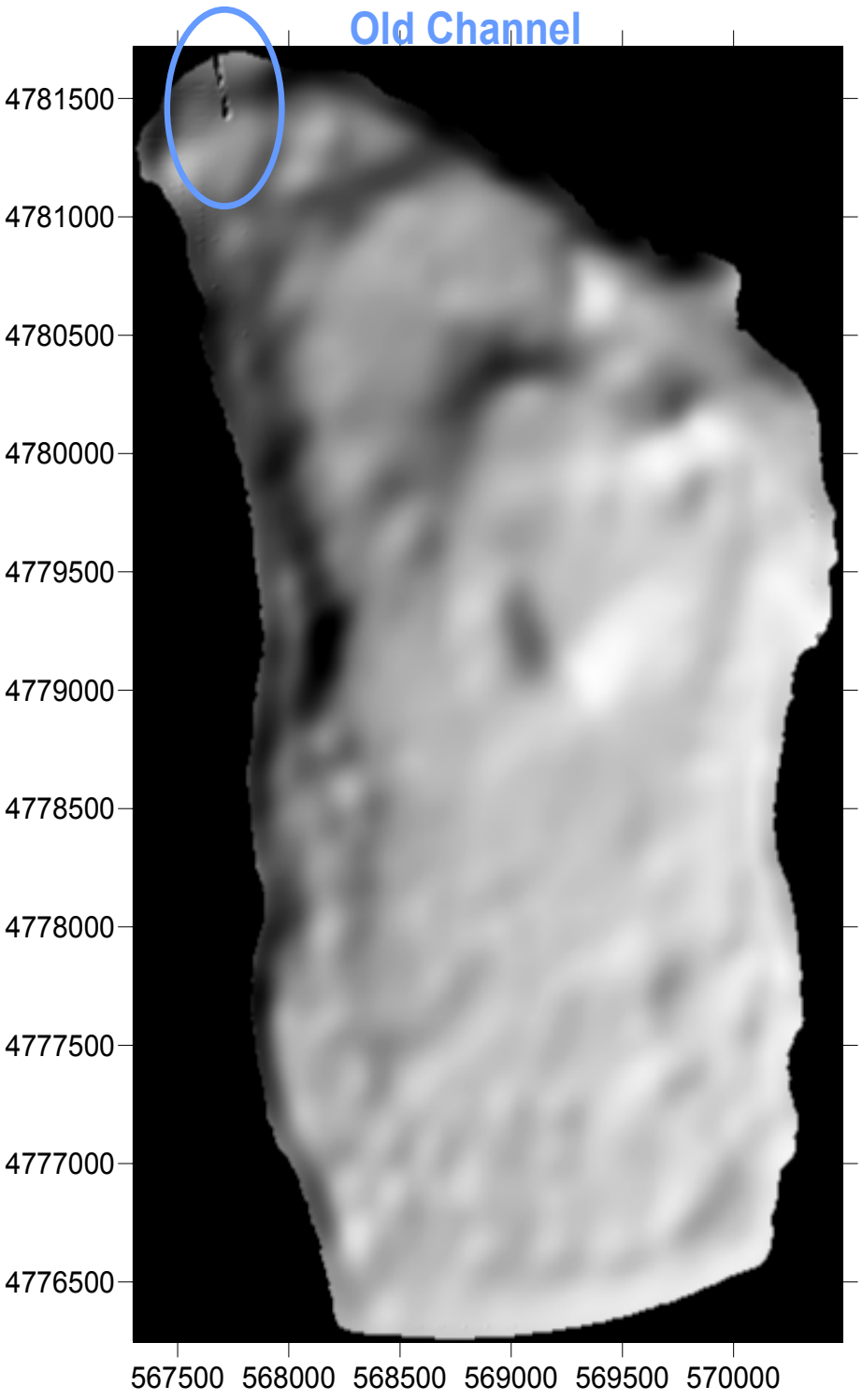

Figure 1. Location of old channel at the northwest end of Diamond Lake.

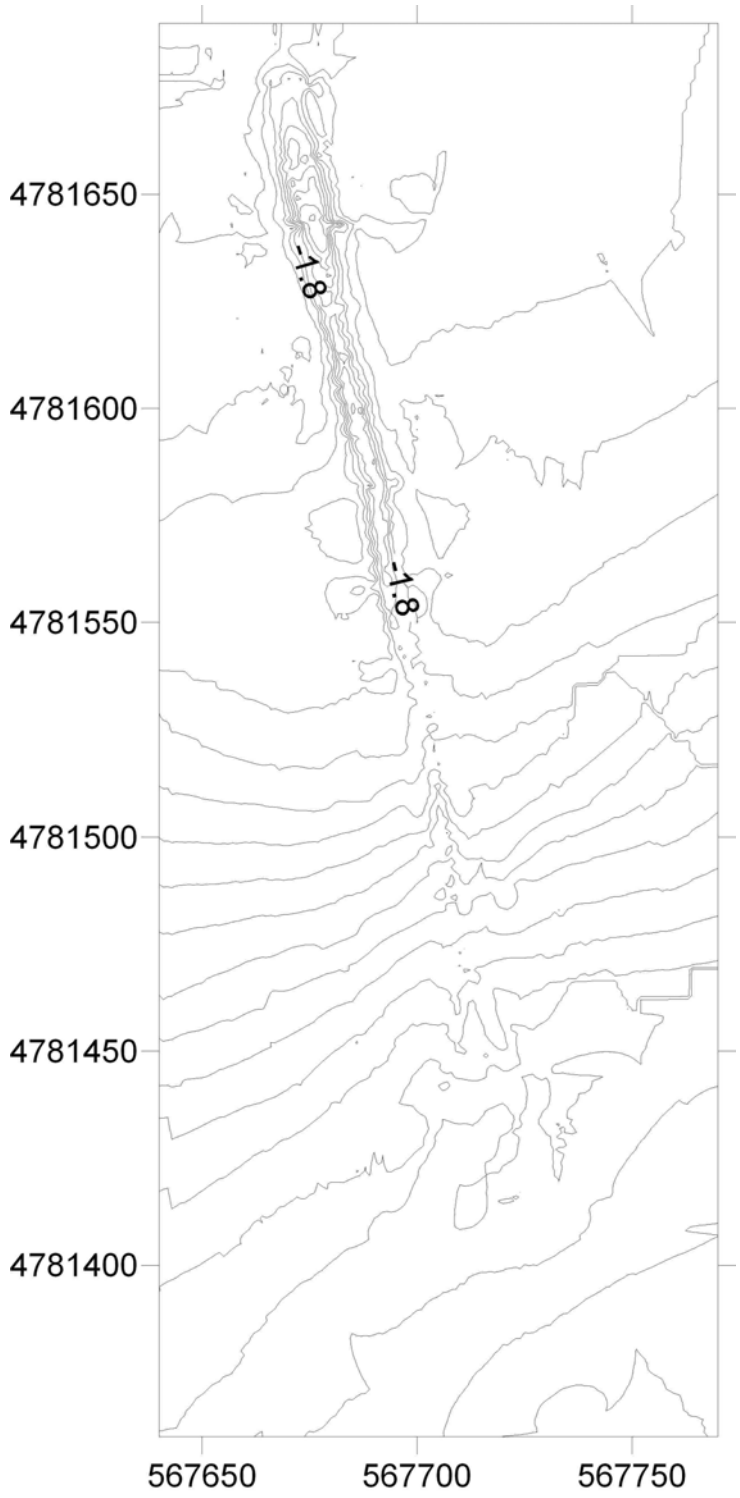

Figure 2. Contour map (in 0.1 m) of the old channel in Diamond Lake.

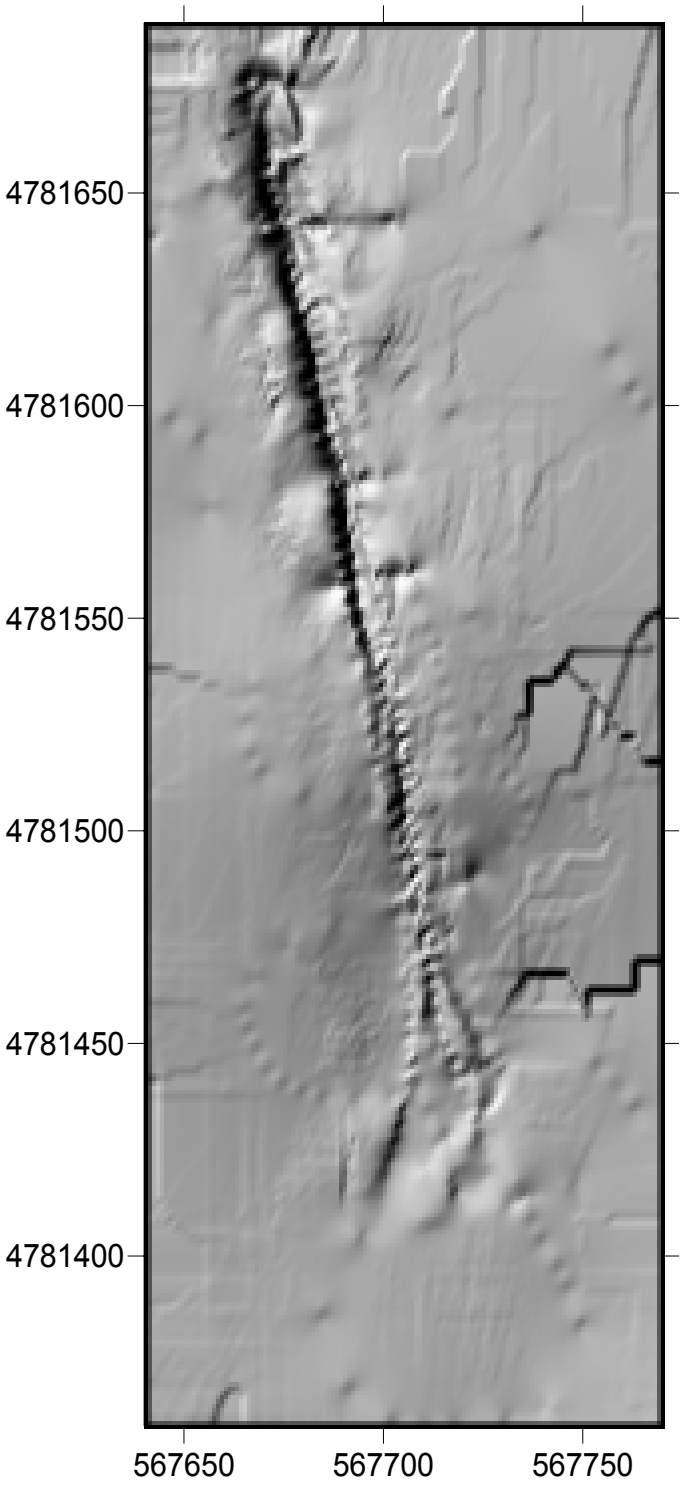

Figure 3. Shaded relief map of the old channel in Diamond Lake. Units on axes are in UTMs.

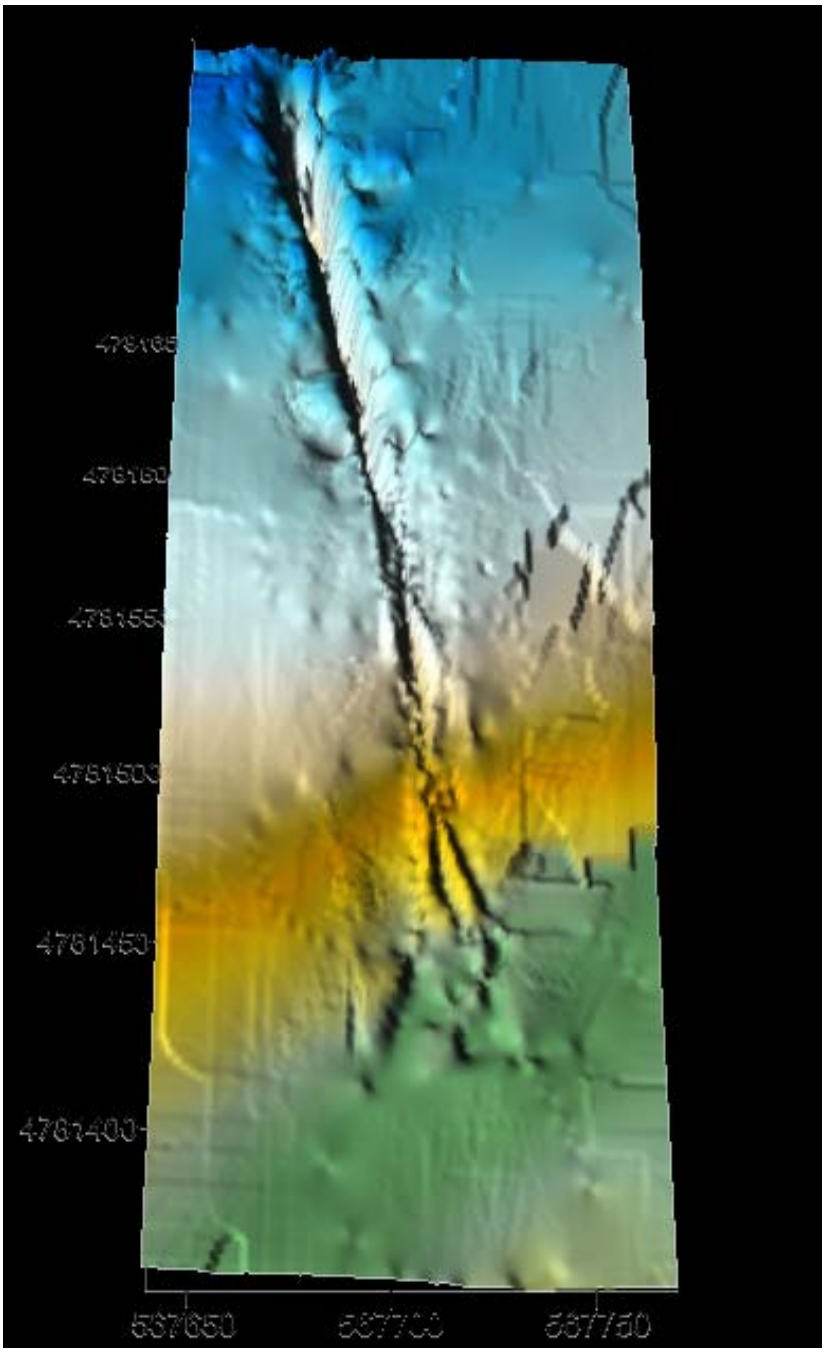

Figure 4. Shaded 3-d relief map of the old channel in Diamond Lake viewed from a 45 º perspective from the lake center to the northwest shore.

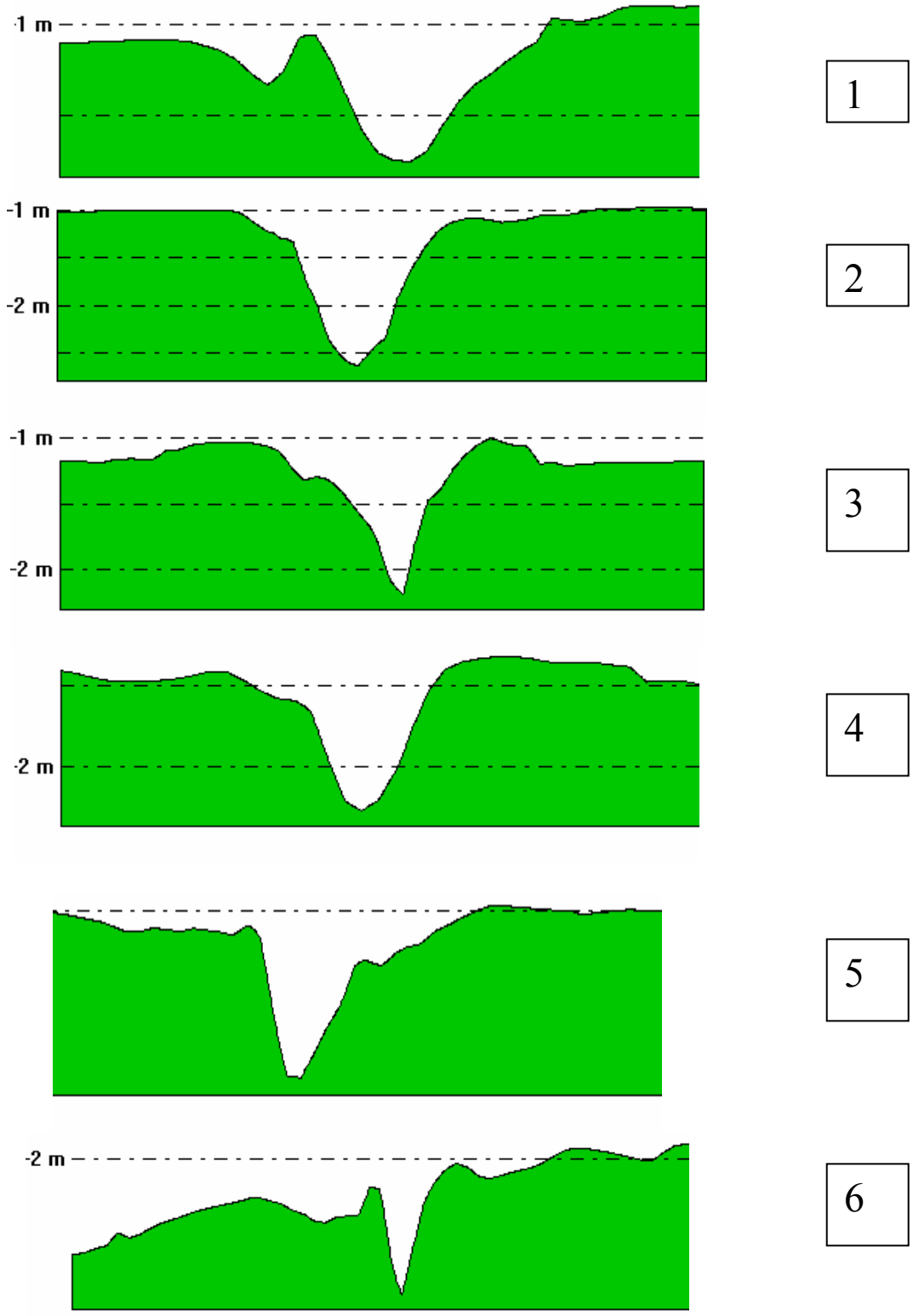

Figure 5. Cross-sections of the old channel in Diamond Lake starting from closest to the shore (1) towards the lake center (6). Units are in meters.

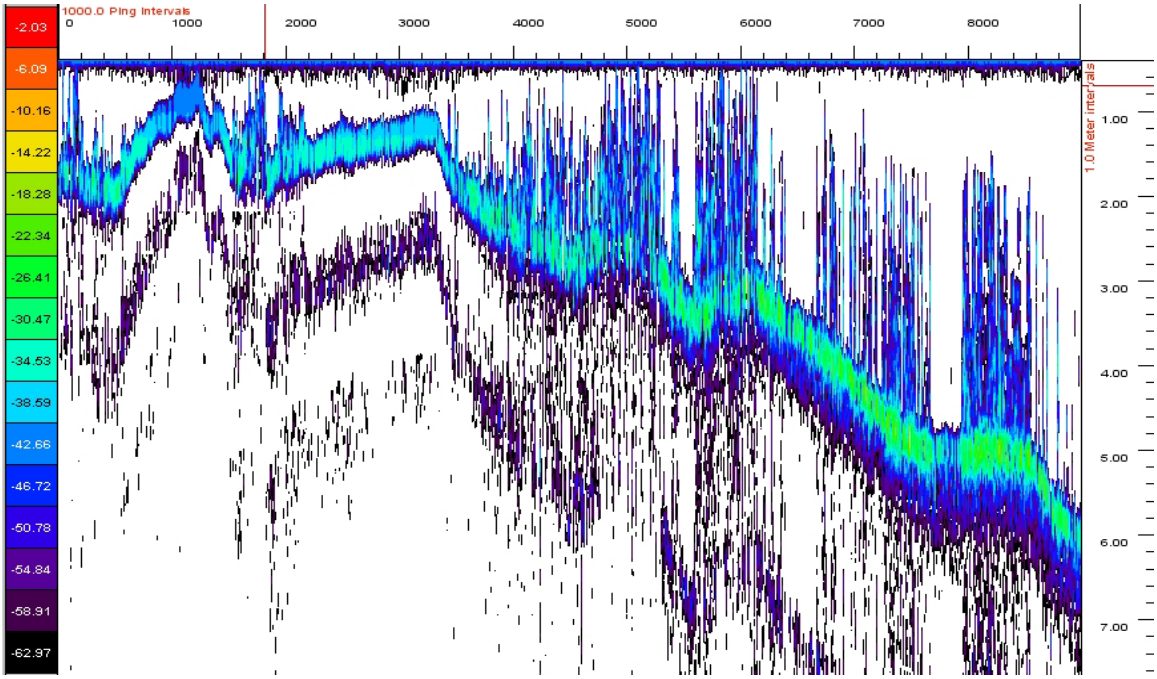

Figure 6. Macrophyte coverage with fish targets imbedded in macrophytes.

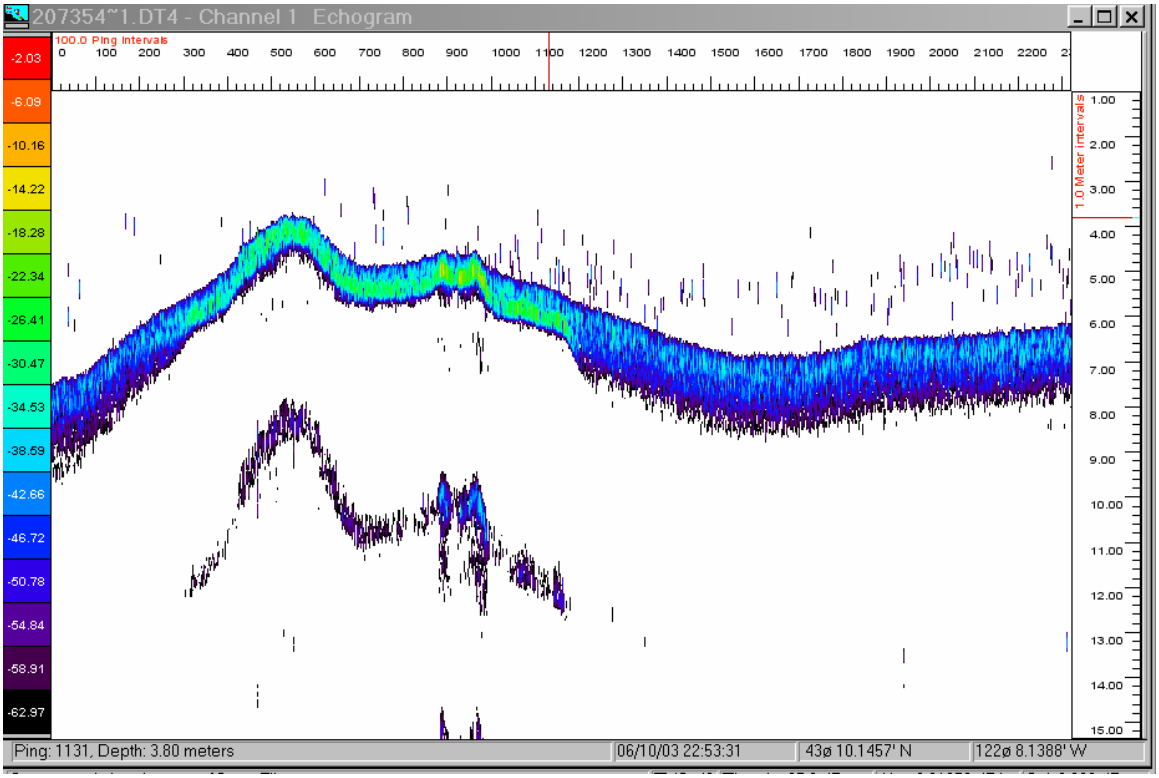

Figure 7. Tui chub concentrating at 5 m depth, north end of Diamond Lake.

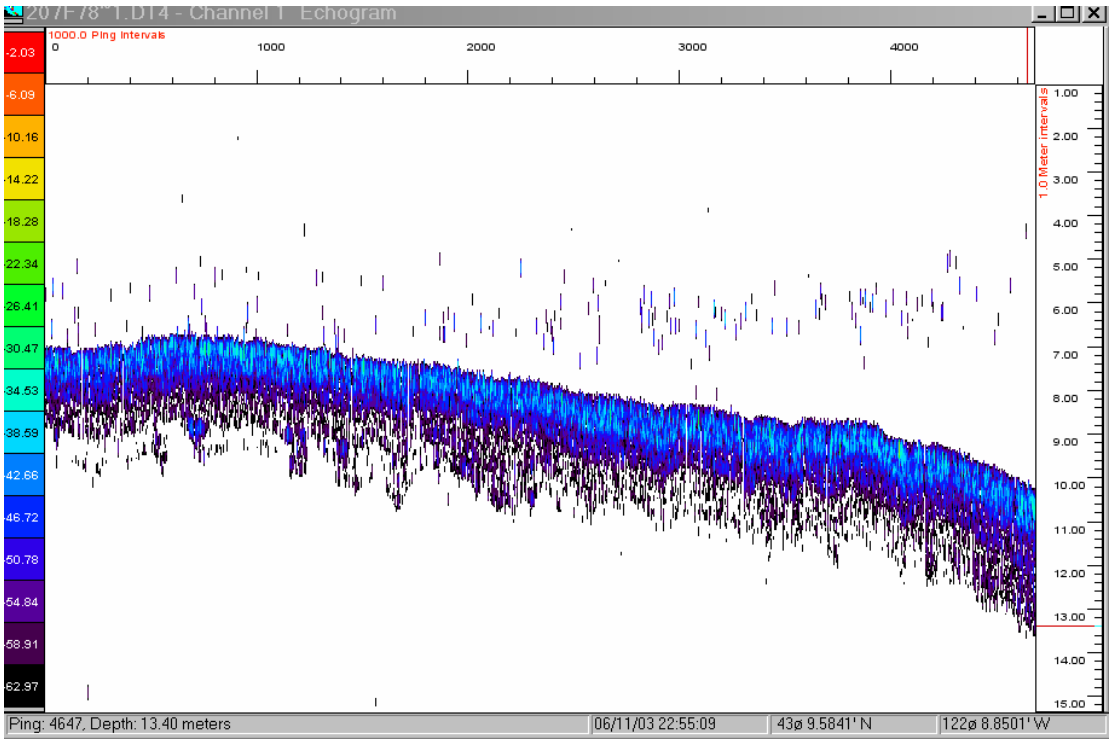

Figure 8. Tui chub targets at 5-6m depth, north end of Diamond Lake.

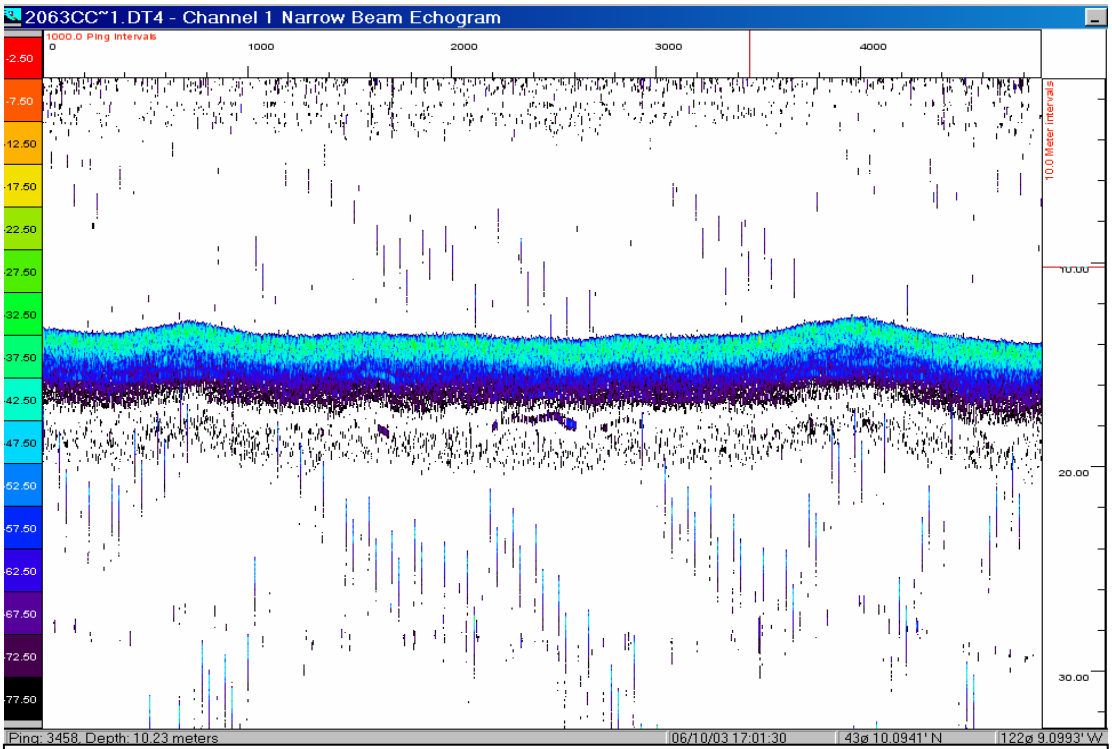

Figure 9. Trout and chub targets in 12m depths, north-central area of lake.

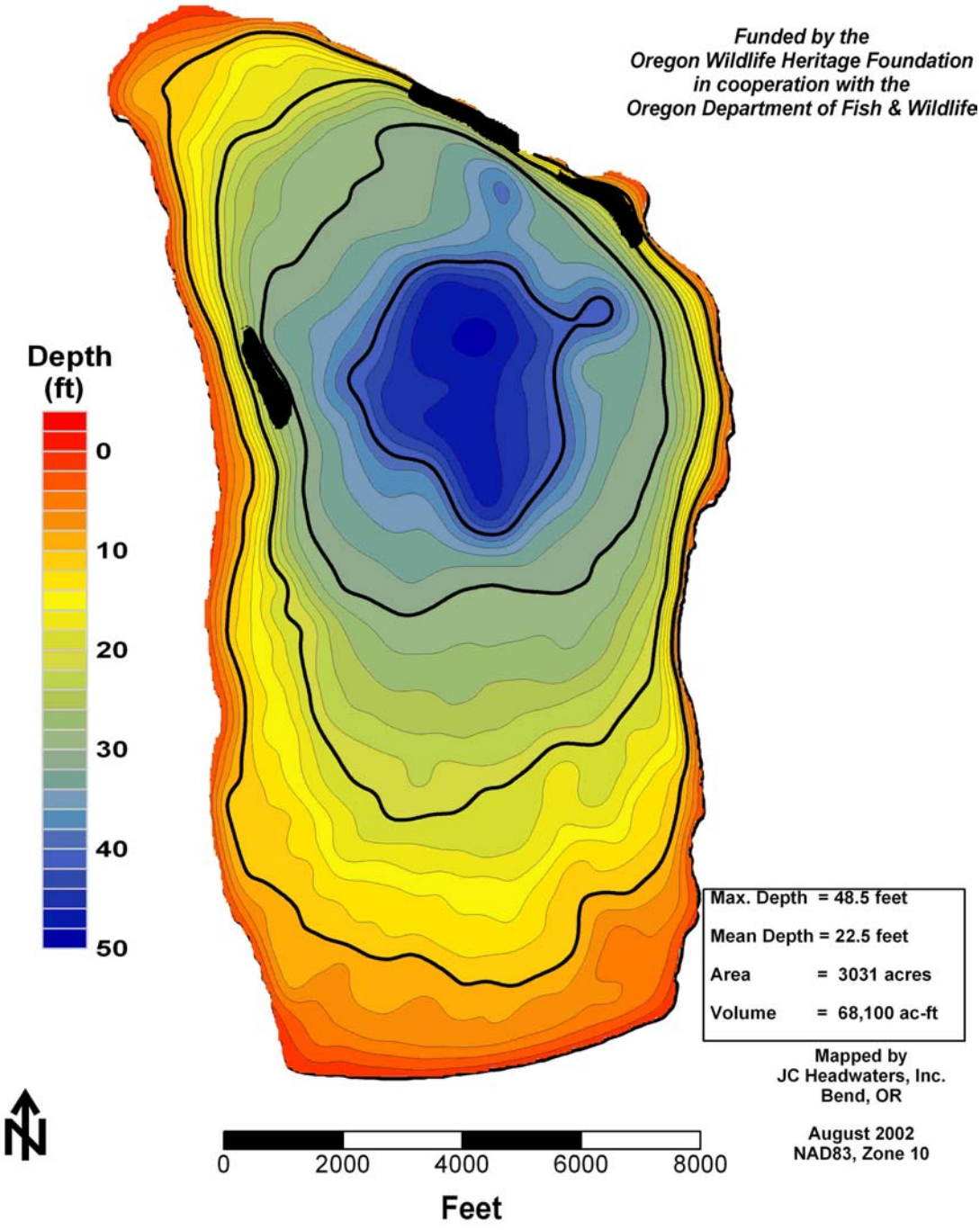

Figure 10. Zones in Diamond Lake with the observed highest concentrations of Tui chub (shown in black); the northern two zones exhibited that greatest concentrations of the three areas displayed.